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Mr. Tim Morrow  
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5280 Panola Ind. Blvd.  
Decatur, GA 30035

November 30, 1990

SUBJECT: Wastewater Treatability Study For Prairie  
Metals Site

Dear Tim:

The following letter report summarizes the analytical data and observations derived from the wastewater treatability study performed on contaminated water from the Prairie Metals site. It is Kiber's understanding that the water sample was a composite of different areas in the "lagoon".

On November 20, 1990, Kiber received a five gallon container of wastewater from the Prairie Metal site. Upon receipt, the sample was mixed until homogenous and a portion of this sample was separated and analyzed for total chromium and pH. The results revealed concentrations of 126 ppm of chromium and a pH of 6.9.

The primary objective of this treatability study was to treat the wastewater to drinking water levels (0.050 ppm) for total chromium.

The method of treatment selected for this treatability study was chemical precipitation followed by sand filtration and carbon adsorption. The following flocculents and coagulants were employed: lime (calcium hydroxide), sodium hydroxide, alum (aluminum sulfate) and a high molecular weight cationic polymer (Allied 767). Table 1 illustrates the agents and concentrations tested in the study. The pH of the treated samples were analyzed and are presented in Table 2.

During the chemical precipitation testing, a Phipps and Bird gang stirrer was used to facilitate the mixing process. This stirrer can test up to six samples at one time at varying rates of speed ranging from flash mixing to slow flocculation speeds.

The precipitation agents were tested either separately or in combination. Visual interpretation was performed on all samples. The rate of settling, the quantity of sludge produced, and the rate of clarity of the supernatant were key factors in evaluating each mixture.

Based on the results of the testing performed, the following procedures were determined to be the most beneficial and effective. Initially, the pH of the water was raised to 11.0 with lime or sodium hydroxide while mixing at a moderate speed. Aluminum sulfate was then added at concentrations shown in Table 1 and was then mixed at a slow rate of speed. These procedures were selected due to the rate of settling, clarity of supernatant, ease of handling and cost efficacy.

After the samples were precipitated, the supernatant of the mixes were filtered through a sand filter medium to eliminate fine suspended solids which did not settle out during the precipitation phase.

Once the water was filtered through the sand, it was introduced into a Carbon (12x40 mesh) column with 5 minute retention time. Tables 3 and 4 illustrate the chromium concentrations of the treated samples.

Based on the results and observations as shown in the Tables, it was determined that lime and sodium hydroxide alone or in combination with alum produced the desired chromium results. The precipitation testing reduced the chromium levels to drinking water standards. The levels were further reduced to below detection limits through sand and carbon treatment.

The final pH of the treated water ranges from 7.5 through 12.5. Since discharge will be in a creek the pH of the water was lowered with 1 normal sulfuric acid. Table 5 illustrates these results.

Should you have any questions regarding the data or report, please feel free to call me at (404) 455-3944.

Sincerely,  
Kiber Associates, Inc.



Neville W. Kingham  
Technical Director

nwk5:hazpwater

TABLES ONE THROUGH FIVE

KIBER ASSOCIATES, INC.  
PRAIRIE METALS WATER TREATMENT  
AGENT MIXTURES  
TABLE 1

SAMPLE #	AGENT MIXTURES	SAMPLE VOLUME
1	5 gm LIME	GALLON
2	50 gm LIME	GALLON
3	2.5 gm LIME & 1.26 gm ALUM	GALLON
4	2.5 gm LIME & 2.5 gm ALUM	GALLON
5	2.5 gm LIME & 5 gm ALUM	GALLON
6	25 gm LIME & 50 gm ALUM	GALLON
7	2.5 gm LIME & POLYMER-727	GALLON
8	25 ml (1N) NaOH	GALLON
9	38 ml (1N) NaOH	GALLON
10	250 ml (1N) NaOH	GALLON
11	38 ml (1N) NaOH & 1.26 gm ALUM	GALLON
12	50 ml (1N) NaOH & 1.26 gm ALUM	GALLON
13	25 ml (1N) NaOH & 2.5 gm ALUM	GALLON
14	38 ml (1N) NaOH & 2.5 gm ALUM	GALLON
15	250 ml (1N) NaOH & 25 gm ALUM	GALLON

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KIBER ASSOCIATES, INC.  
PRAIRIE METALS WATER TREATMENT  
AGENT MIXTURES AND pH  
TABLE 2

SAMPLE #	AGENT MIXTURES	SAMPLE VOLUME	FINAL pH
1	5 gm LIME	GALLON	12.672
2	50 gm LIME	GALLON	12.345
3	2.5 gm LIME & 1.26 gm ALUM	GALLON	12.238
4	2.5 gm LIME & 2.5 gm ALUM	GALLON	9.828
5	2.5 gm LIME & 5 gm ALUM	GALLON	9.838
6	25 gm LIME & 50 gm ALUM	GALLON	10.669
7	2.5 gm LIME & POLYMER-727	GALLON	12.250
8	25 ml (1N) NaOH	GALLON	11.512
9	38 ml (1N) NaOH	GALLON	12.009
10	250 ml (1N) NaOH	GALLON	11.445
11	38 ml (1N) NaOH & 1.26 gm ALUM	GALLON	11.672
12	50 ml (1N) NaOH & 1.26 gm ALUM	GALLON	11.748
13	25 ml (1N) NaOH & 2.5 gm ALUM	GALLON	6.495
14	38 ml (1N) NaOH & 2.5 gm ALUM	GALLON	10.598
15	250 ml (1N) NaOH & 25 gm ALUM	GALLON	6.871

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KIBER ASSOCIATES, INC.  
PRAIRIE METALS WATER TREATMENT  
CHROMIUM CONCENTRATIONS  
TABLE 3

SAMPLE #	AGENT MIXTURES PER GALLON	TOTAL CHROMIUM (ppm)
1	5 gm LIME	<0.05
2	50 gm LIME	NR
3	2.5 gm LIME & 1.26 gm ALUM	0.072
4	2.5 gm LIME & 2.5 gm ALUM	<0.05
5	2.5 gm LIME & 5 gm ALUM	<0.05
6	25 gm LIME & 50 gm ALUM	NR
7	2.5 gm LIME & POLYMER-727	0.077
8	25 ml (1N) NaOH	NR
9	38 ml (1N) NaOH	<0.05
10	250 ml (1N) NaOH	NR
11	38 ml (1N) NaOH & 1.26 gm ALUM	<0.05
12	50 ml (1N) NaOH & 1.26 gm ALUM	<0.05
13	25 ml (1N) NaOH & 2.5 gm ALUM	NR
14	38 ml (1N) NaOH & 2.5 gm ALUM	NR
15	250 ml (1N) NaOH & 25 gm ALUM	NR

NR = NOT RUN

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KIBER ASSOCIATES, INC.  
PRAIRIE METALS WATER TREATMENT  
CHROMIUM CONCENTRATIONS  
TABLE 4

SAMPLE #	AGENT MIXTURES PER GALLON	TOTAL CHROMIUM (ppm)
1	5 gm LIME	0.033
5	2.5 gm LIME & 5 gm ALUM	0.042
8	25 ml (1N) NaOH	<0.025
11	38 ml (1N) NaOH & 1.26 gm ALUM	<0.025
1*	5 gm LIME	0.038
5*	2.5 gm LIME & 5 gm ALUM	0.03/0.029
8*	25 ml (1N) NaOH	<0.025
11*	38 ml (1N) NaOH & 1.26 gm ALUM	<0.025
1**	5 gm LIME	0.031
5**	2.5 gm LIME & 5 gm ALUM	<0.025
8**	25 ml (1N) NaOH	<0.025
11**	38 ml (1N) NaOH & 1.26 gm ALUM	<0.025/<0.025

\* SAND FILTER

\*\* SAND FILTER & CARBON

/ = DUPLICATE

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KIBER ASSOCIATES, INC.  
 PRAIRIE METALS WATER TREATMENT  
 pH ADJUSTMENT WITH 1 NORMAL SULFURIC ACID  
 TABLE 5

SAMPLE #	AGENT MIXTURES PER GALLON	INITIAL pH	FINAL pH	ml OF ACID
1	5 gm LIME	6.65	6.65	0
2	50 gm LIME	8.689	8.689	0
3	2.5 gm LIME & 1.26 gm ALUM	NR	NR	NR
4	2.5 gm LIME & 2.5 gm ALUM	NR	NR	NR
5	2.5 gm LIME & 5 gm ALUM	NR	NR	NR
6	25 gm LIME & 50 gm ALUM	NR	NR	NR
7	2.5 gm LIME & POLYMER-727	10.859	7.59	0.2
8	25 ml (1N) NaOH	12.150	7.66	1.05
9	38 ml (1N) NaOH	NR	NR	NR
10	250 ml (1N) NaOH	NR	NR	NR
11	38 ml (1N) NaOH & 1.26 gm ALUM	NR	NR	NR
12	50 ml (1N) NaOH & 1.26 gm ALUM	12.247	8.25	1.4
13	25 ml (1N) NaOH & 2.5 gm ALUM	10.570	7.27	0.15
14	38 ml (1N) NaOH & 2.5 gm ALUM	10.894	7.27	0.15
15	250 ml (1N) NaOH & 25 gm ALUM	NR	NR	NR

NR=NOT RUN

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